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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
|-----------------|-------------|----------------------|---------------------|
| 087843,124 | 04/25/97 | W G FASSE | 3442 |

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11/11/0112

EXAMINER
DEFILED

| ART UNIT | PAPER NUMBER |
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| 1105 | 3 |

DATE MAILED: 01/12/98

Please find below and/or attached an Office communication concerning this application or proceeding.

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3

DATE MAILED:

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

OFFICE ACTION SUMMARY

- ☐ Responsive to communication(s) filed on _____
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 D.C. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

- ☒ Claim(s) 1 thru 20 is/are pending in the application.
- Of the above, claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1 thru 20 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claims _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some ☒ None of the CERTIFIED copies of the priority documents have been received.
- ☐ received in Application No. (Series Code/Serial Number) _____
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

- ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- ☒ Notice of Reference Cited, PTO-892
- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s) 2
- ☐ Interview Summary, PTO-413
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Notice of Informal Patent Application, PTO-152

-- SEE OFFICE ACTION ON THE FOLLOWING PAGES --

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DETAILED ACTION

Drawings

1. The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81. No new matter may be introduced in the required drawing.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

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3. Claims 1,3 thru 5, 10, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view of Kawase.

Yamashita shows a method for growth III-V (GaAs) semiconductor single crystals, comprising the steps of:

Filling the crucible (pBN) with small pieces of oxide of boron (B₂O₃) and the raw material in an airtight vessel; heating the crucible by the heater housed in the airtight vessel; and pulling up the melted GaAs liquid from the crucible body by keeping the airtight vessel at a high pressure. (See columns 2 thru 5 and abstract).

The moisture concentration of B₂O₃ is less than 100 ppm.

The difference between the claims and the prior art is that the crystal is doped with a carbon.

Kawase (Low dislocation density and low residual strain semi insulating GaAs growth by vertical boat method) teaches the use a source of a carbon as a doping agent in the growth of GaAs. (See abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamashita method by the teaching of Kawase in order to obtain high electrical characteristic crystal having impurities removed.

4. Claim 2, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view of Kawase and Bourret-Courchesne.

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Yamashita and Kawase show all the limitations, except that the B₂O₃ should be heating and melted before contact the carbon.

Bourret-Courchesne teaches that the crucible temperature is first raises to a temperature greater than the melt temperature of the B₂O₃ and the oxide is allowed to melt and form a liquid layer. Then the temperature is raised to the melting temperature of the raw material. The raw material is keep in the melted state for some time to allow reaction to occur. (See abstract and columns 3 thru 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamashita and Kawase method by the teaching of Bourret-Courchesne in order to eliminated random nucleation and the tendency of the semiconductor charge to stick to the crucible walls.

5. Claims 6 thru 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view of Kawase.

Yamashita and Kawase show all the limitations, except that the amount of filled carbon is larger than the amount of a doped carbon into the crystal (a least 10-times larger); the carbon source is heated before filling the crucible (1 - 12 hours, at 500°C to 2000°C at certain pressure).

However, in the absence of unobvious results, it would have been obvious to one of ordinary skill in the art to determine through routine experimentation the optimum, operable parameters in the prior art in order to promote the reaction using an excessive amount of carbon

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since the reaction rates is extremely low and remove the impurities of the carbon in order to obtain a crystal of higher purity.

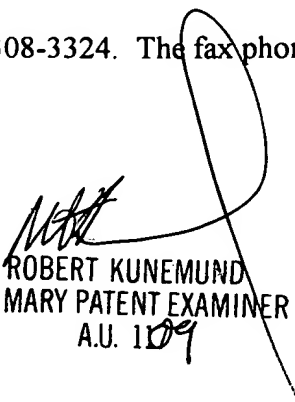
6. Claims 12 thru 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view of Kawase.

Yamashita and Kawase show all the limitations, except the use of different types of a solid carbon.

However, in the absence of unobvious results, it would have been obvious to one of ordinary skill in the art to determine through routine experimentation the optimum, operable type of solid carbon used in the prior art in order to increase to contact surfaces and the velocity of the reaction.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evelyn Defillo whose telephone number is (703) 305-4635. The examiner can normally be reached on Monday thru Friday from 7:15 A.M. to 4:45 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bruce Breneman, can be reached on (703) 308-3324. The fax phone number for this Group is (703) 305-3600.


ROBERT KUNEMUND
PRIMARY PATENT EXAMINER
A.U. 1109